
Network Call Redirection

Network Call Redirection (NCRD) provides Network Call Forward No Answer (NCFNA) and Network Call Forward All Calls (NCFAC) over an ISDN PRI or ISL network. Calls can be transferred over the network, but the Calling Line Identification (CLID) display does not reflect the reason for the transfer.

With X11 release 16 and later software, Network Call Redirection (NCRD) incorporates these features:

- Network Call Forward Busy NCFB
- Network Hunt NHUNT
- Network Transfer NXFER
- Call Pickup PKUP
- Call Forward by Call Type CFCT

Network Call Redirection (NCRD) is based on standard Call Redirection, which permits call redirection within a Meridian 1. NCRD redirects calls through more than one PBX over ISDN. The Calling Line ID (CLID) shows a name and network DN in place of the local DN.

On a system level, NCRD supports Meridian 1 to Meridian 1, SL-100, and DMS-100 connections. Private numbering plans, Uniform Dialing Plans (UDPs) in ESN, and the Coordinated Dialing Plan (CDP) are supported by both network configurations.

If the calling party's numbering plan is any other type, then Call Forward by Call Type (CFCT) calls use Route Class Marks (RCLS) to determine call type—internal or external. The features interfacing with network services also support expanded DNs.

Some redirected calls can pass through or tandem one switch. If a call is redirected several times, only one CFNA (or NCFNA) is allowed, unless the forwarding telephone has Second Level CFNA defined.

The following telephone types are supported by this feature:

- Meridian 1 Digit Display telephones
- 500/2500 telephones (for redirection only without display)
- Attendant telephones
- M2000 and M3000 digital telephones
- M2317 digital telephones
- M2008, M2016S, M2216ACD, and M2616 when equipped with displays

Note: A redirected call over PRI that ends on a busy telephone cannot activate the Network Ring Again (NRAG) feature.

NCRD terminology

There are four types of parties in a call redirection scenario:

- the originating party
- the originally dialed DN
- the redirecting party
- the terminating party

In a simple call redirection, a call is redirected once. When A calls B, and B redirects the call to C, the following parties are identified:

A is the originating party
B is the originally called party and the redirecting party
C is the terminating party

With further call redirection, the party's terminology changes:

A calls B	A is the originating party
	B is the originally dialed DN
B redirects the call to C	C is the redirecting party
C redirects the call to D	D is the terminating party

Originating party notification

An originating party with CLID services can display a reason for the call redirection. Figure 53 shows the format on a Digit Display for the originating party on an internal redirection.

Figure 53
Display format for NCRD: Originating party with CLID

Originally called party DN	Terminating party DN	Reason for redirection	Terminating party name
----------------------------	----------------------	------------------------	------------------------

The “Reason for redirection” field shows why the call is redirected. The mnemonic displayed is assigned by the customer in LD 95. See the chapter on configuring PRI for the procedure to program Network Call Redirection (NCRD). For a complete description of the prompts and responses available, see the *X11 input/output guide* (553-3001-400).

In addition, NCRD uses Q.931 notification messages to indicate that a transfer has occurred. An extra message helps update telephones and telephone displays to show the reason for call redirection. Also, the displays for attendant extended calls are complete to all call parties.

Terminating party notification

The Digit Display for a terminating party with CLID allowed shows the reason for call redirection. Figure 54 is an example of the format for a terminating party on an internal call redirection.

Figure 54
Display format for NCRD: Terminating party with CLID

Calling Line ID	Originally called number	Reason for redirection	Calling party name
-----------------	--------------------------	------------------------	--------------------

If the originating party information is not available, the redirecting party DN is displayed instead.

Tones on redirection

Tones returned to the originating party are determined by the reason for call redirection. Table 67 lists which call redirections return a tone and which tone they return.

All the items in this table relate to network services only. Most of these features have similar or exact applications in the regular PBX network, without ISDN functionality.

A redirection counter is transmitted with the call forwarding information. When the count meets the redirection counter maximum, there are two possible scenarios:

- Network Call Forward All Calls (NCFAC)
If all call redirections are due to NCFAC, then the calling party receives overflow tone.
- Network Call Forward No Answer (NCFNA)
If one of the redirections is due to NCFNA, then an attempt is made to re-ring the telephone that initiated the NCFNA.

Table 67
Tones returned on call redirection

Reason for redirection	Tone returned	Conditions
Attendant extended calls	Overflow (Fast Busy)	Invalid call attempt
Busy (CFB)	Busy	Far end has an active call in progress See note.
Call Forward No Answer (CFNA)	Ringing	Network CFNA tries again to ring the dialed DN
Call Pick up	1 Overflow	1 Invalid access code, or invalid Pickup DN
	2 Busy	2 Call already answered by another Pickup Group member
Call Transfer (XFER)	Overflow	1 Invalid call attempt
		2 Transferring party without XFER allowed
Hunt	Busy	No answer to any Hunt DN and no attendant is available
Overflow	Overflow (Fast Busy)	
Note: Hunt overrides CFB. When busy, telephones with both features have calls forwarded to the Hunt DN. The originator receives overflow tone when the call is unable to terminate. The exception is when the "forward to" DN is busy and no redirections are allowed due to NCFNA.		

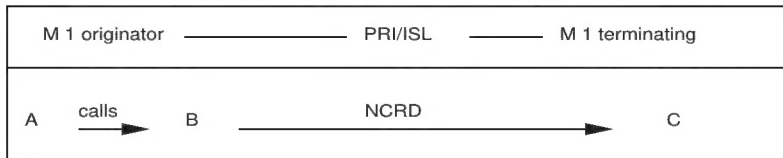
NCRD configurations

The following figures are examples of typical call redirection configurations. The text associated with each figure explains the scenarios. These scenarios are shown in Figure 55:

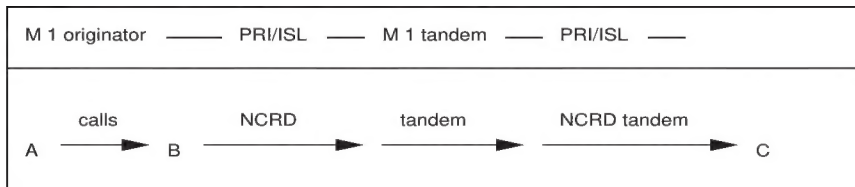
- Intranode NCFAC
- Internode tandem NCFAC
- Tandem NCFAC
- Tandem NCFAC and intranode redirection
- NCFNA
- Tandem NCFNA

Figure 55
Network configurations for NCFAC and NCFNA

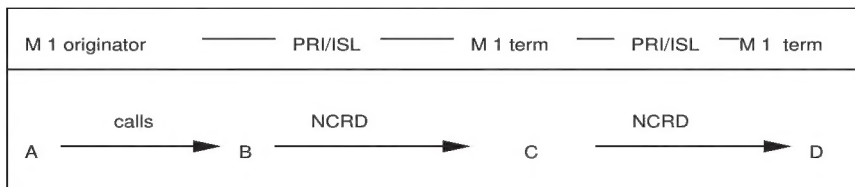
Meridian 1 to Meridian 1 configuration for NCFAC and NCFNA



Tandem Meridian 1 configuration for NCFAC and NCFNA



Multiple hops configuration for NCFAC only



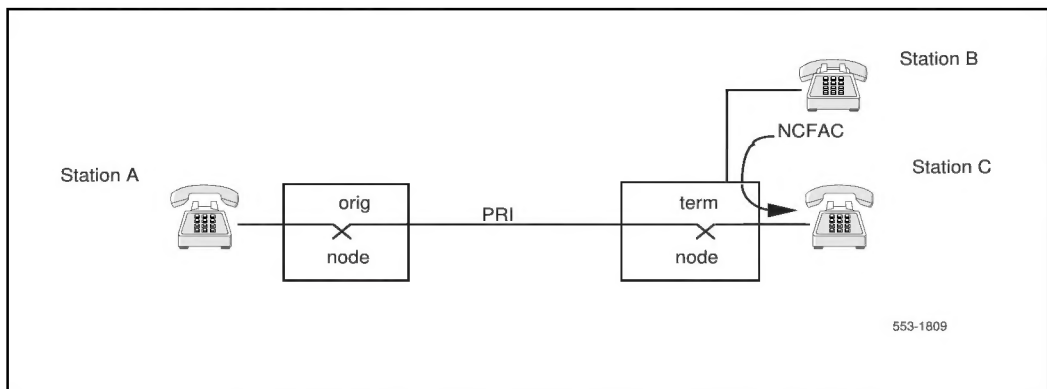
553-1815

Intranode NCFAC redirection

The following sequence occurs in an NCFAC scenario. See Figure 56.

- 1 Station A calls Station B on another node. Station B has Call Forward All Calls and forwards to Station C.
- 2 The call is then forwarded to Station C. Station C resides in the same terminating node as Station B.
- 3 The terminating node, Station C, sends the CLID display information to Station A. When Station C answers the call, a message is sent to the originating node, Station A.

Figure 56
Intranode NCFAC redirection



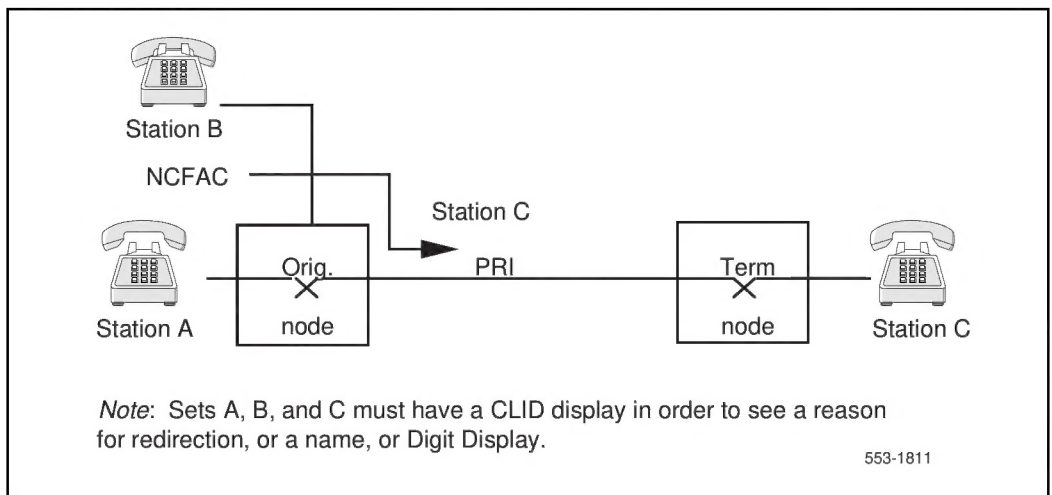
Note: Sets A, B, and C must have a display in order to see a reason for redirection, or a name or Digit Display.

Internode NCFAC redirection

The following occurs in an internode NCFAC redirection scenario. See Figure 57.

- 1 Station A generates a call to Station B. Station B has Call Forward All Calls and forwards to Station C. Station C is located on another switch, making this an internode call.
- 2 A message that contains the called number, calling number, original called number, original redirection reason, and the redirection counter is sent with the call.
- 3 When Station C answers the call, a message is sent to the originating node indicating this response.

Figure 57
Internode NCFAC



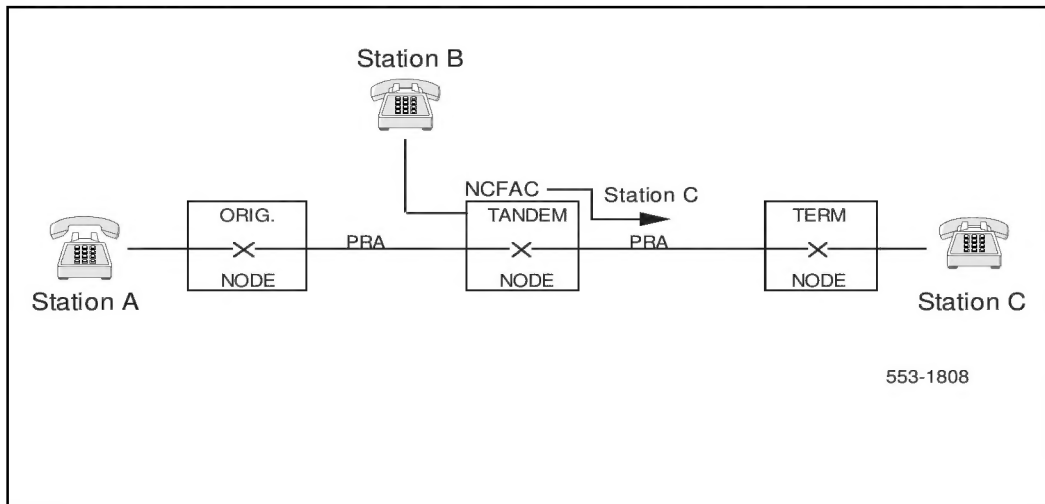
Note: Sets A, B, and C must have a CLID display in order to see a reason for redirection, or a name or Digit Display.

Tandem NCFAC redirection

The following scenario occurs in tandem NCFAC redirection. See Figure 58.

- 1 Station A generates an internode call to Station B. Station B has Call Forward All Calls and forwards to Station C on another switch.
- 2 The call is translated at the tandem node and then forwarded to Station C at the terminating node.
- 3 The message that accompanies the call from the tandem to the terminating node contains the called number (Station C), the calling number (Station A), the original called number (Station B), the original reason for redirection (NCFAC), and the redirection counter that has a value of 1.
- 4 The terminating node sends a message to the originating node that contains the call forwarding information along with an indication of ringing Station C.
- 5 When Station C answers the call, a message indicating this response is sent first to the tandem node and then relayed to the originating node.

Figure 58
Tandem NCFAC



Note: Sets A, B, and C must have a CLID display in order to see a reason for redirection, or a name or Digit Display.

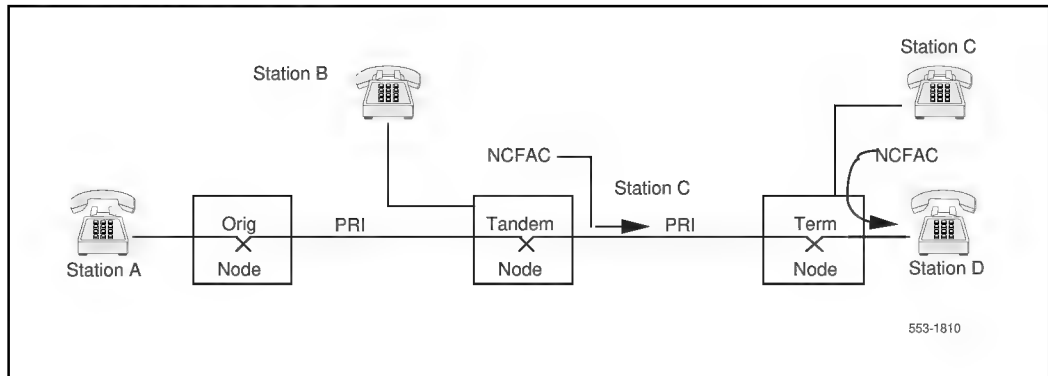
Tandem NCFAC and intranode redirection

The following occurs in a tandem NCFAC. This is followed by an intranode redirection scenario. See Figure 59.

- 1** Station A generates an internode call to Station B. This Station B has Call Forward All Calls and forwards to Station C on another node. In this scenario, Station C has Call Forward All Calls and forwards the call to telephone D on the same node.
- 2** The call is forwarded from the tandem node to the terminating node for Station C. The CLID information is sent as a message along with the call. This information includes:
 - redirected party number (Station C)
 - calling number (Station A)
 - original called number (Station B)
 - original redirection reason (CFAC or NCFAC)
 - the redirection counter (1)
- 3** The call is then forwarded to telephone D within the terminating node. The terminating node sends the call forwarding information to the originating node (Station A).
- 4** The redirection counter is still 1 since there was a single network redirection.
- 5** Station D answers and a message is sent notifying the originating node of this response.

Note: Sets A, B, and C must have a display in order to see a reason for redirection, or a name or Digit Display.

Figure 59
Tandem NCFAC Intranode

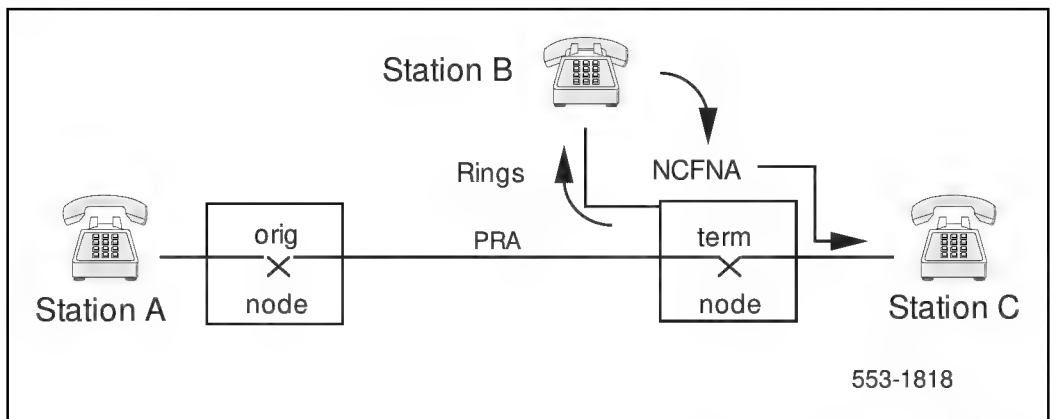


NCFNA redirection

The following occurs in an NCFNA redirection scenario. See Figure 60.

- 1 Station A generates an internode call to Station B, which has Call Forward No Answer and forwards to Station C.
- 2 The call is forwarded to Station C when the ringing (or alerting) phase times out.
- 3 The terminating node sends a message to the originating node that contains the redirection number (Station C) and the redirection reason (NCFNA).
- 4 When Station C answers the call, the terminating node generates a message to the originating node indicating this response.

Figure 60
NCFNA



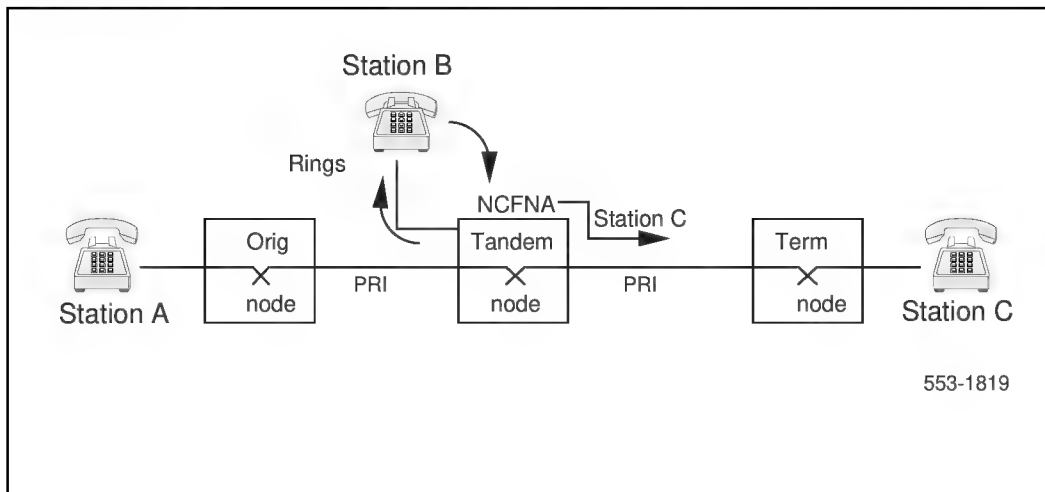
Note: Sets A, B, and C must have a display in order to see a reason for redirection, or a name or Digit Display.

Tandem NCFNA redirection

The following occurs in tandem NCFNA redirection. See Figure 61.

- 1 Station A generates an internode call to Station B, which has Call Forward No Answer and forwards to Station C.
- 2 The call is transferred to Station C when the ringing (alerting) phase times out.
- 3 The message sent to the terminating node contains the terminating party number (Station C), calling number (Station A), original called number (Station B), original reason for redirection (NCFNA), and the redirection counter with a value of 1.
- 4 The terminating node sends a message to the tandem node, which relays the message to the originating node with the redirection number (Station C) and the reason for redirection.

Figure 61
Tandem NCFNA



Note: Sets A, B, and C must have a display in order to see a reason for redirection, or a name or Digit Display.

Network Call Forward Busy

See Figures 62 through 65.

Figure 62
Remote NCFB

- 1 DID trunk A initiates a call to remote Station B (on a different node), which has NCFB enabled.

NCFB = Network Call Forward Busy

- 2 NCFB forwards the call to Station C, on a node local to the originally dialed Station B.

- 3 Station C answers the call.

The terminating telephone receives the call information to display the reason for redirection and, if available, the originating number and name.

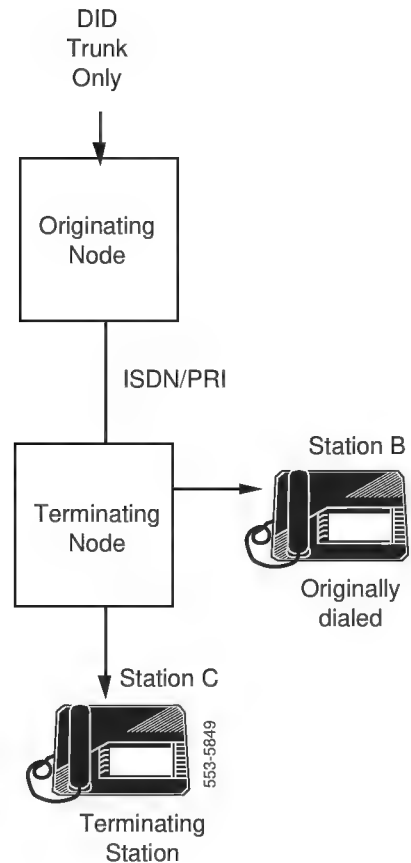


Figure 63
Internode NCFB

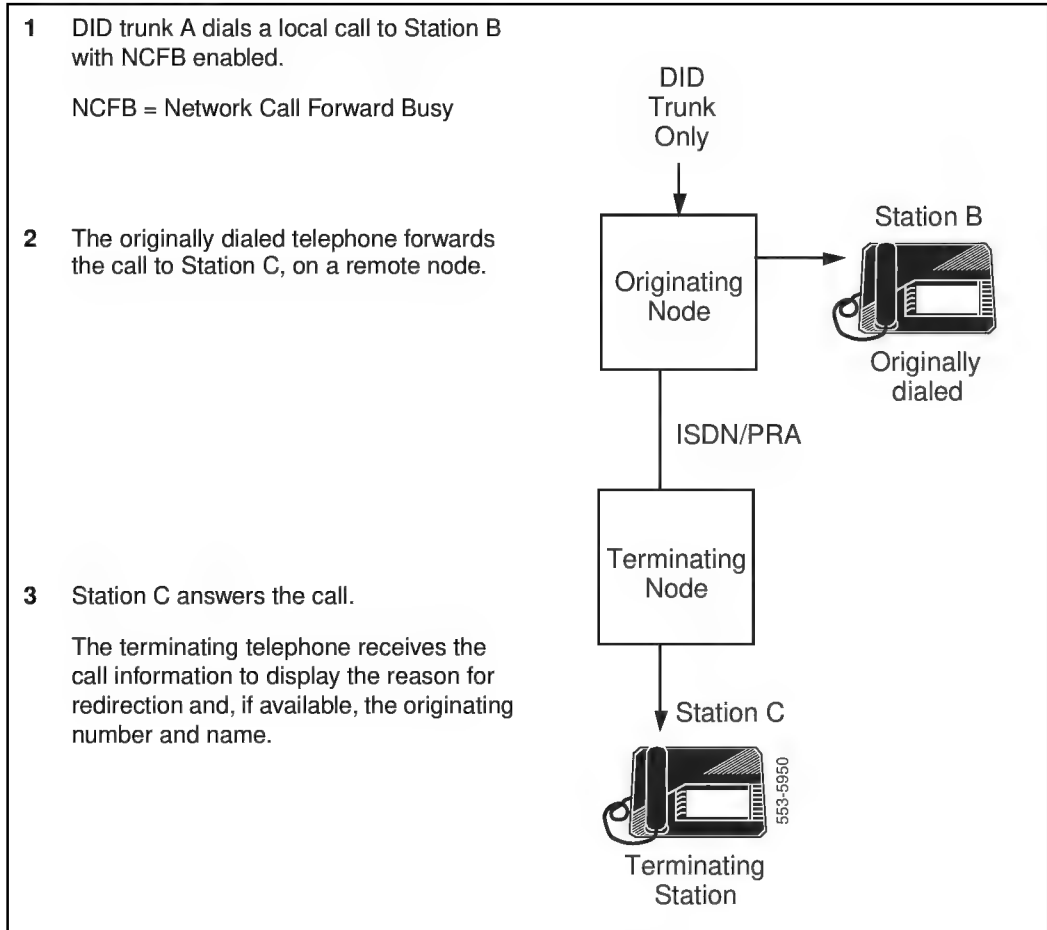


Figure 64
NCFB through a tandem node, example 1

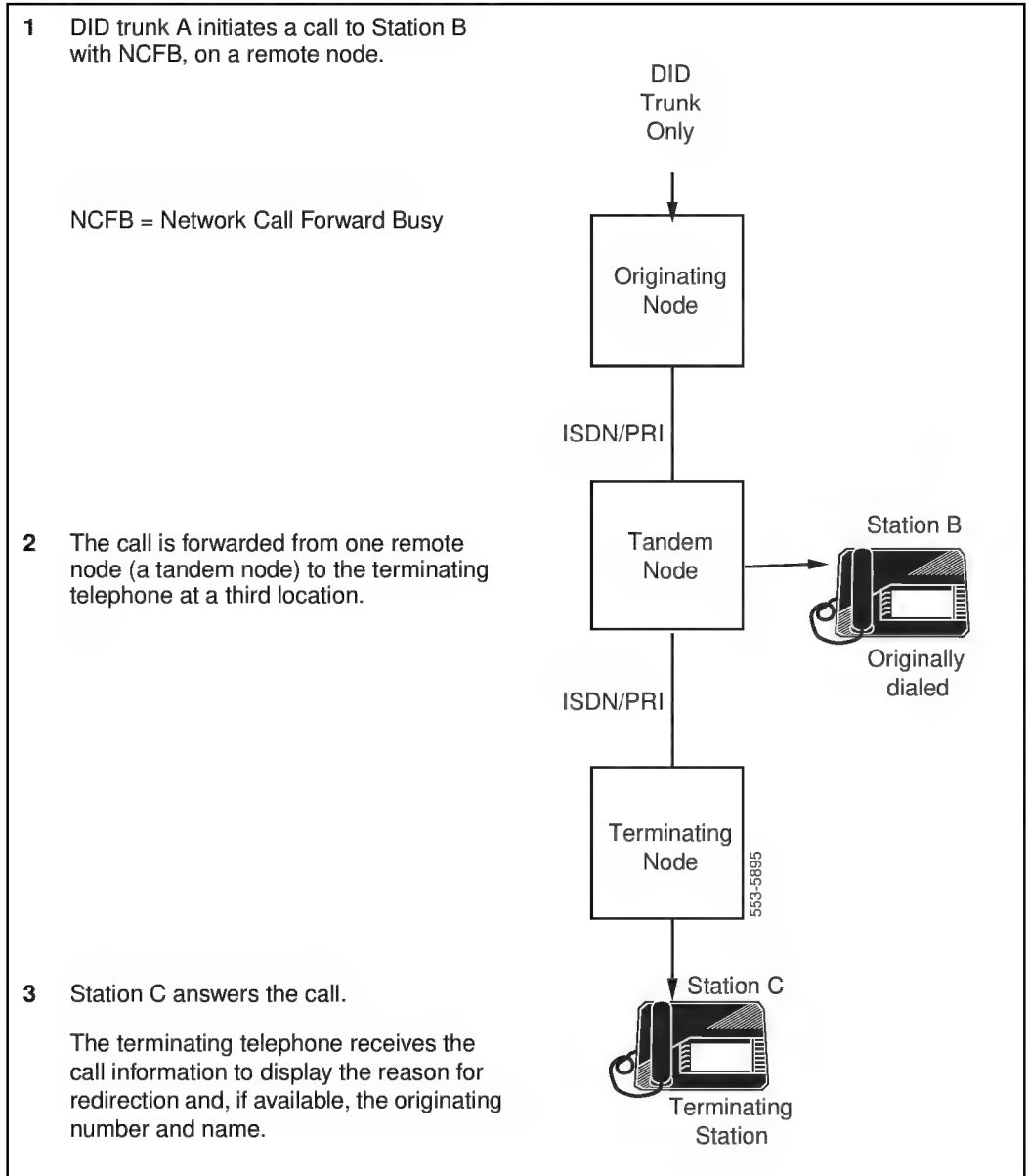
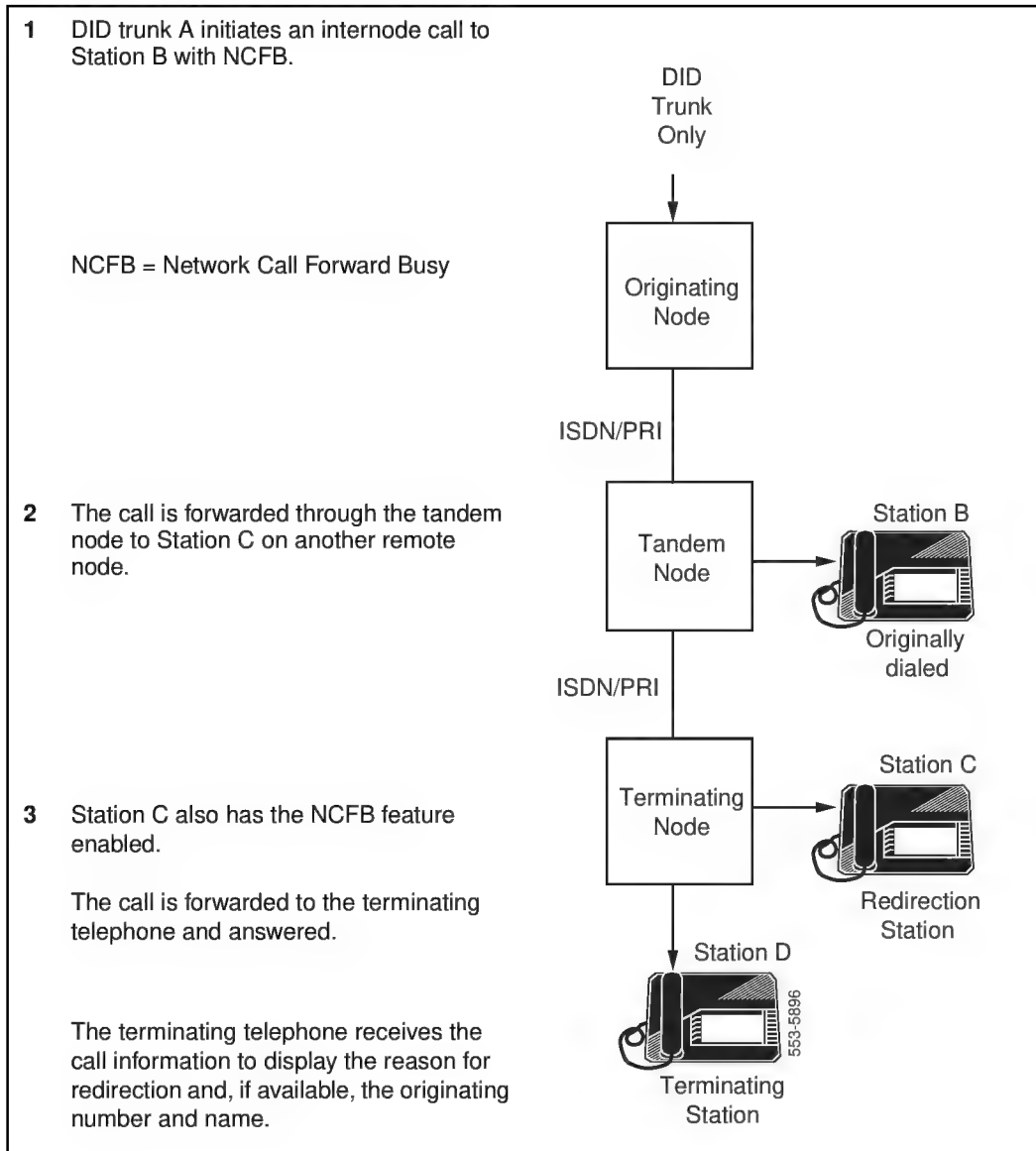


Figure 65
NCFB through a tandem node, example 2



Network Hunt

See Figures 62 through 69.

Figure 66
Remote NHNT

- 1 Station A initiates a call to remote Station B (on a different node), which has NHNT enabled.

NHNT = Network Hunt

- 2 NHNT forwards the call to Station C, on a node local to the originally dialed Station B.

- 3 Station C answers the call.

The terminating telephone receives the call information to display the originating number, name, and reason for redirection.

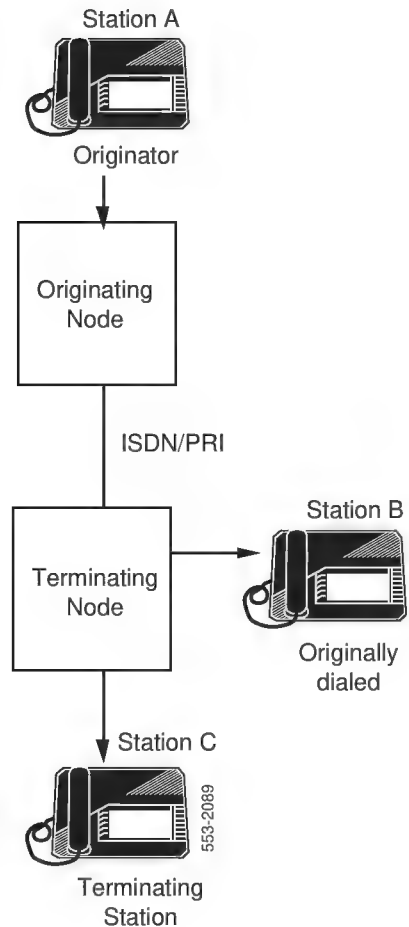


Figure 67
Internode Hunting

- 1 Station A dials a local call to Station B with NHNT enabled.

NHNT = Network Hunt

- 2 The originally dialed telephone forwards the call to Station C, on a remote node.

- 3 Station C answers the call.

The terminating telephone receives the call information to display the originating number, name, and reason for redirection.

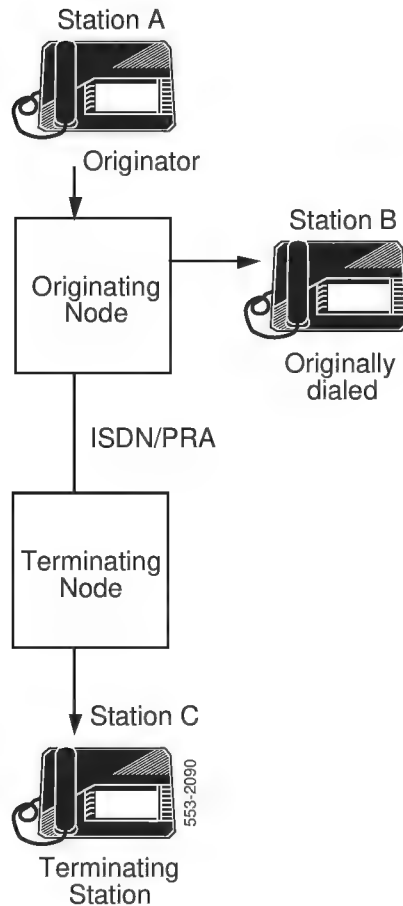


Figure 68
NHNT through a tandem node, example 1

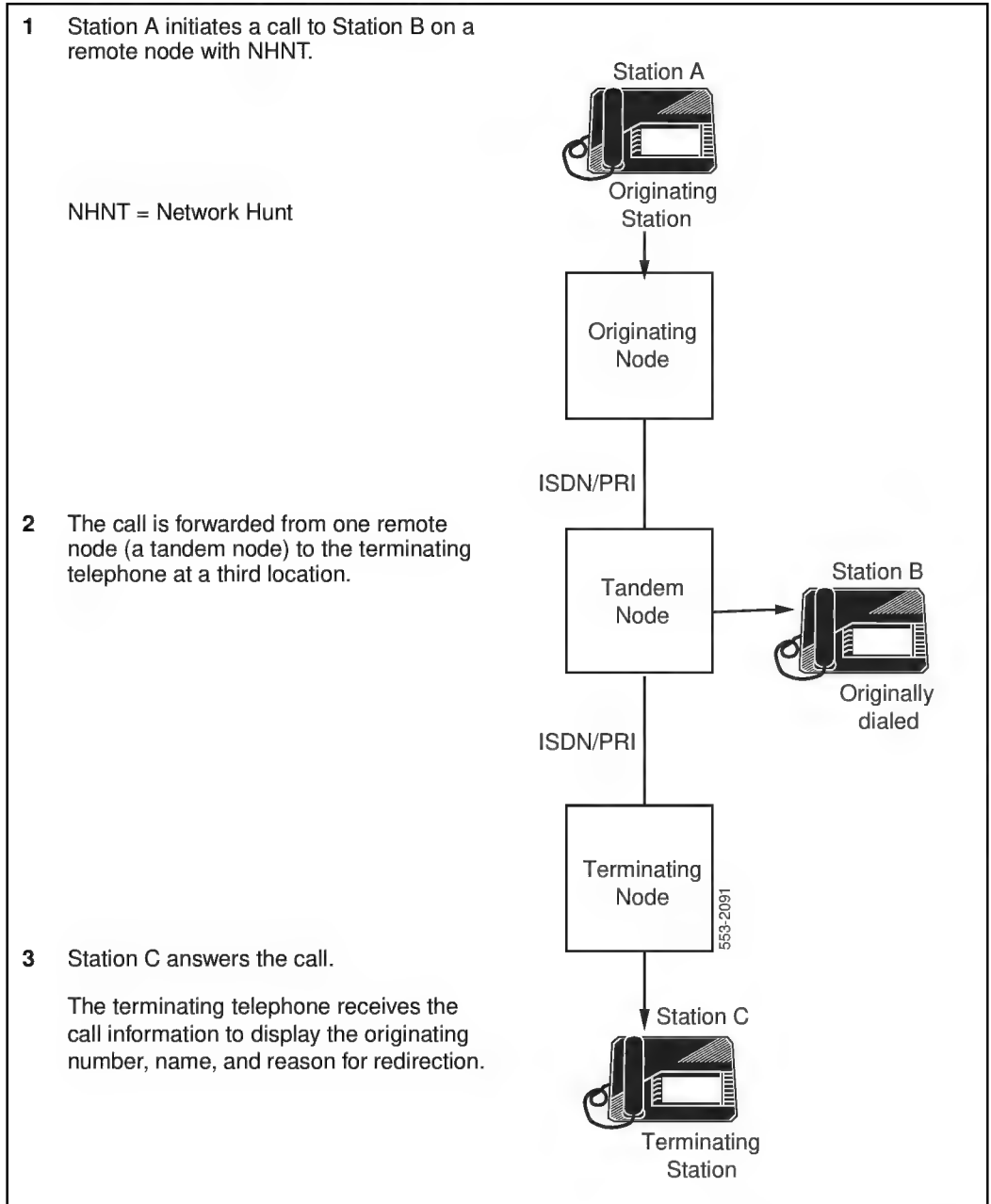
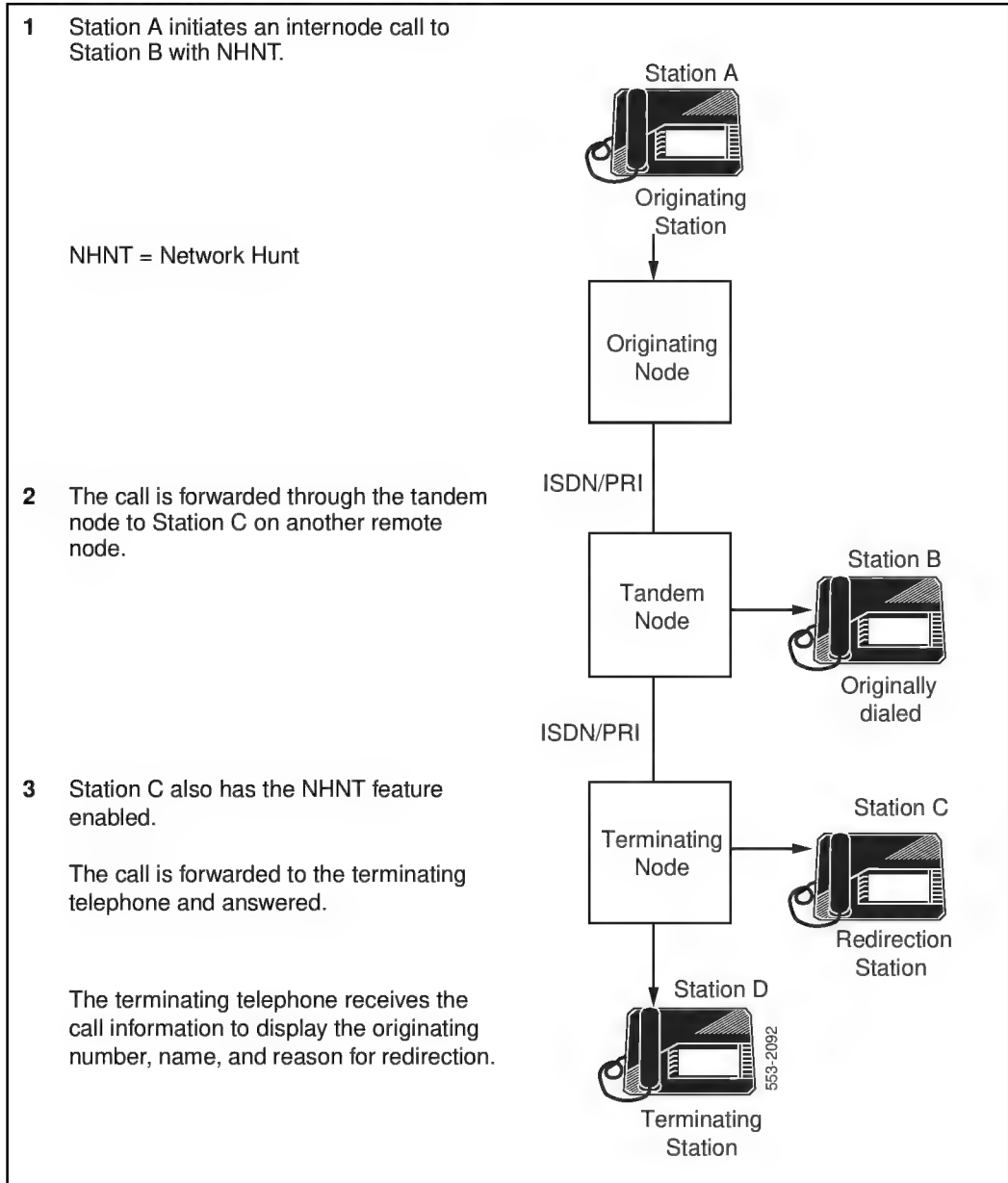


Figure 69
NHNT through a tandem node, example 2



Network Transfer

The originally dialed party can transfer a call over ISDN using Network Transfer (NXFER). As with regular call transfers, the incoming call is automatically placed on Hold while the transfer is being set up. When the redirection is complete, the originally dialed telephone is automatically released. Refer to the figures in this section for examples of different Network Transfer (NXFER) scenarios.

Internal call redirections, where all parties are local on the same switch, do not show a reason for redirection on the Digit Display.

This function is not associated with Network Call Transfer, an ESN feature that operates only on analog or digital trunks.

See Figures 70 through 73.

Figure 70
NXFER internode call

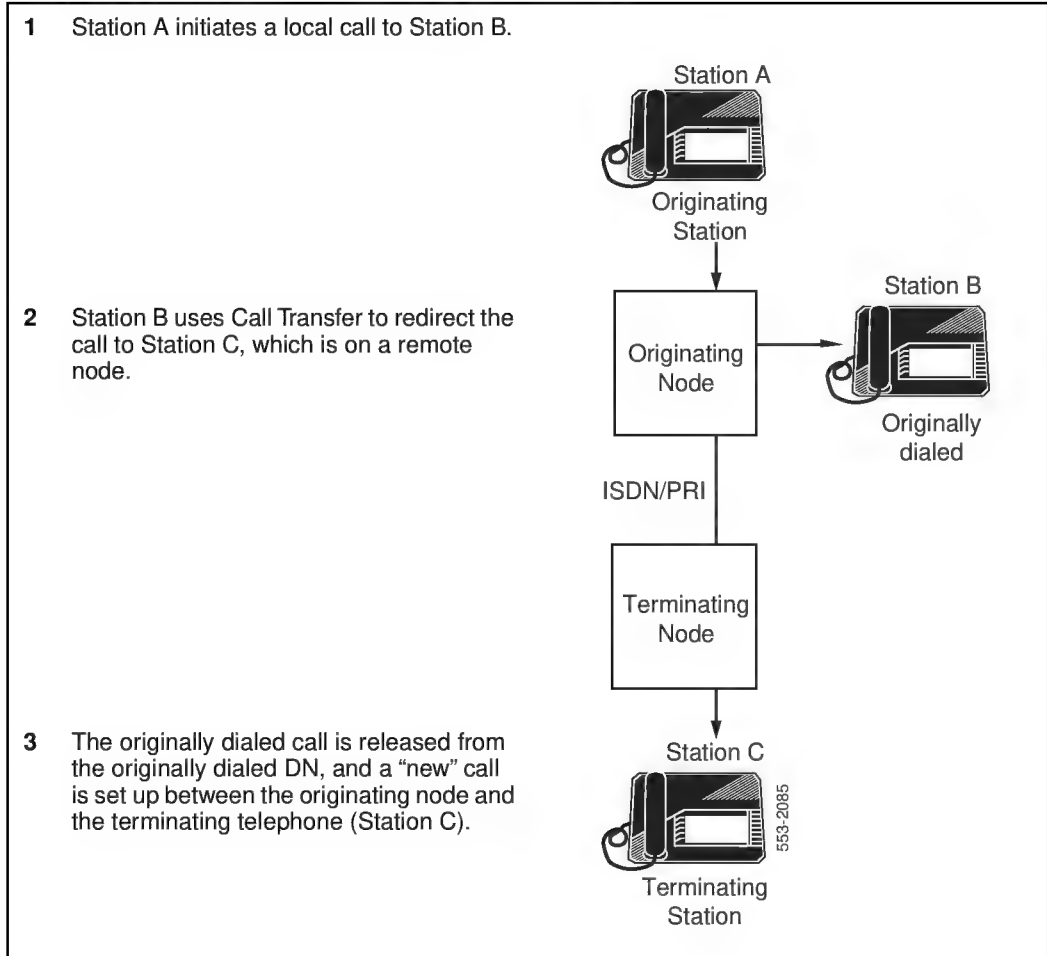


Figure 71
NXFER remote node call

- 1 Station A initiates a remote internode call to Station B.

- 2 Station B answers the call and generates a local Call Transfer to Station C.

- 3 Station B completes the transfer, leaving A connected to C.

When the originally dialed telephone is released from the transfer, the terminating telephone receives the call information to display the originating number, name, and reason for redirection.

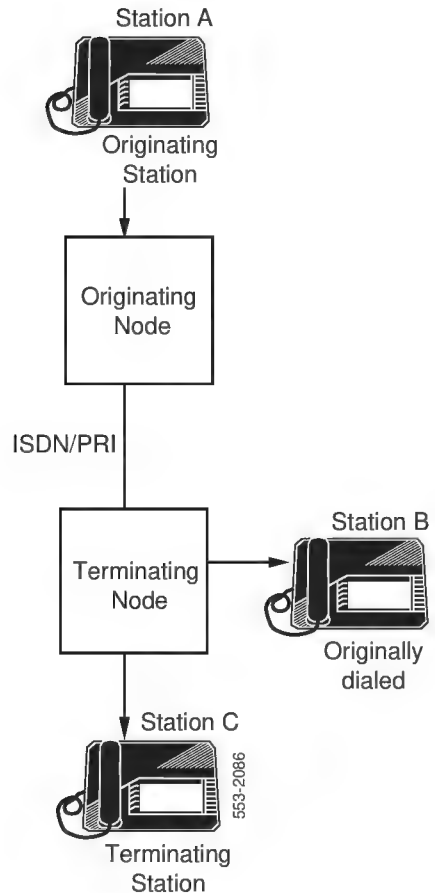


Figure 72
NXFER tandem node call

- 1 Station A initiates a remote internode call to Station B.

- 2 Station B, on a tandem node, transfers the call to Station C on another remote node.

- 3 The call transfer is completed to the terminating telephone, Station C.

When the originally dialed telephone is released from the transfer, the terminating telephone receives the call information to display the originating number, name, and reason for redirection.

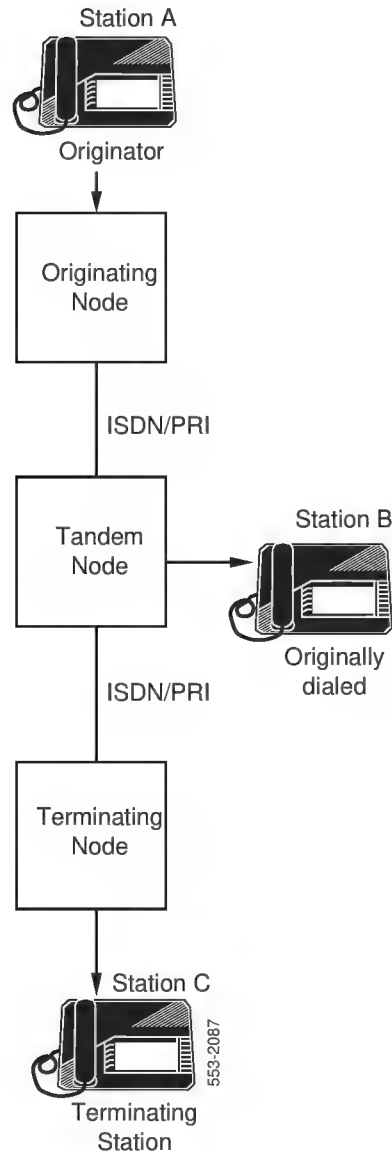
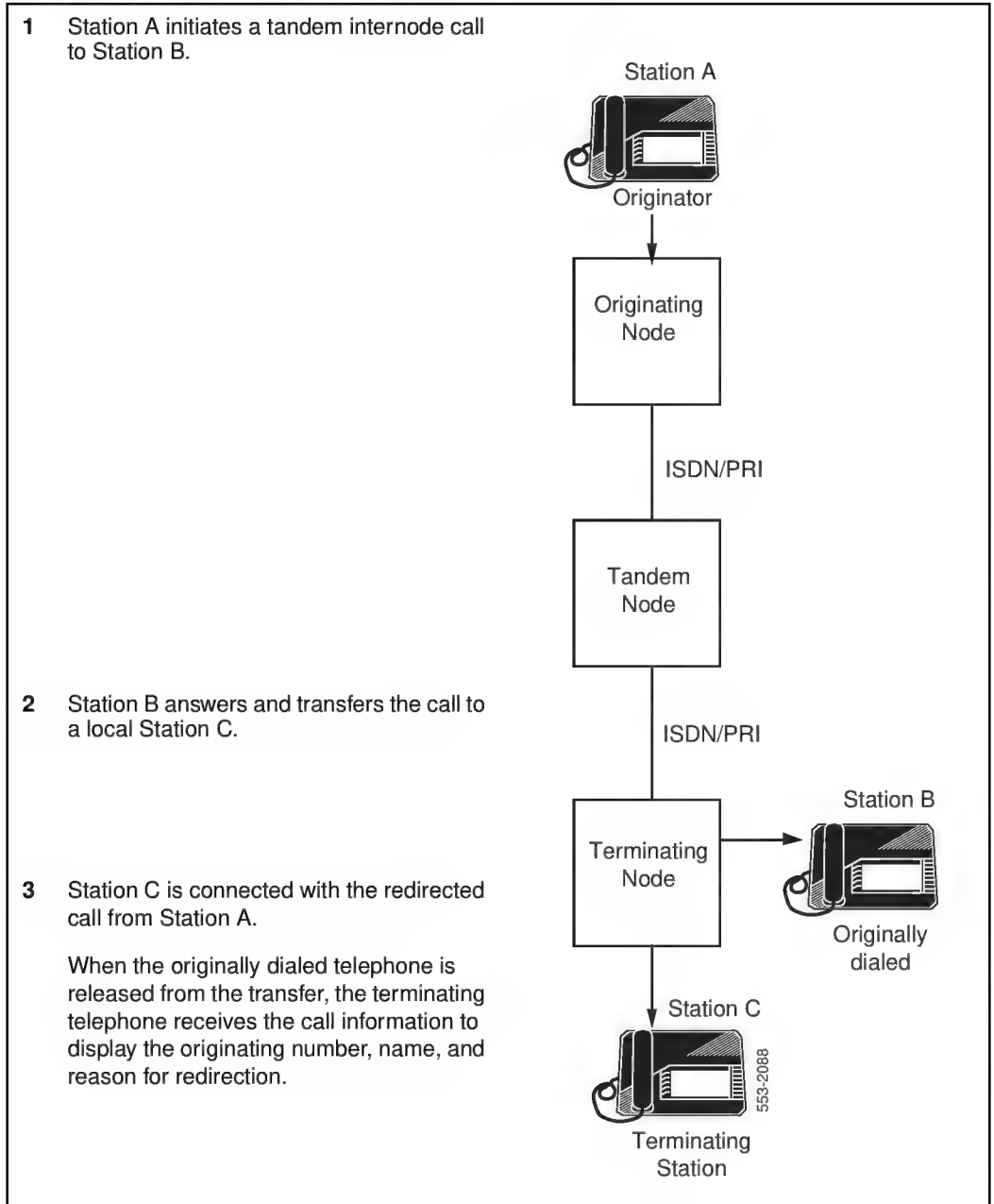
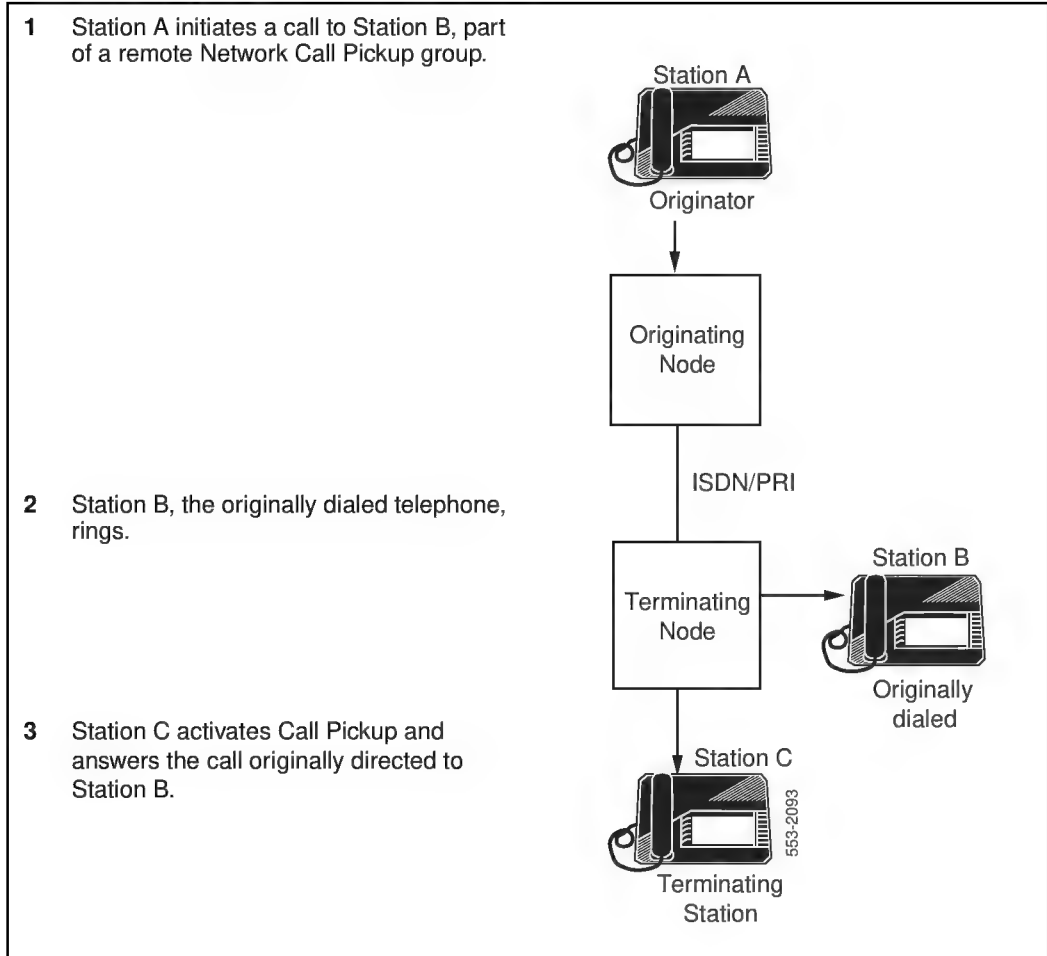


Figure 73
NXFER tandem node remote call



Network Call Pickup

Figure 74
Network Call Pickup



Feature implementation

The following procedures define the administration of the Network Call Redirection features within an ISDN environment.

Incoming calls can be redirected only if the trunk-to-trunk connection is already allowed. Refer to the *X11 input/output guide* (553-3001-400). These networking features are based on the regular features they are named after. For example NCFB is based on Call Forward Busy, and NCFNA is based on Call Forward No Answer. All the same operating parameters apply; refer to the *X11 features and services* (553-3001-305).

Follow the steps described here to implement features for Network Call Redirection:

- Network Call Forward Busy (NCFB)
- Network Hunting (NHNT)
- Network Transfer (NXFER)

To configure NCFNA, NHNT, NCFB, and NXFER, use the following steps:

- 1** LD 15 Configuration Record (Procedure 35)
Forward calls to a forwarding DN.
- 2** LD 16 Route Data Block (Procedure 36)
Allow Network Call Redirection.
- 3** LD 95 Call Party Name Display (Procedure 37)
Display the reason calls are redirected.
- 4** LD 95 Call Party Name Display (Procedure 38)
Give each DN a name.
- 5** LD 10 Single-line telephone sets (Procedure 39)
Enable the appropriate feature in the data block.
- 6** LD 11 Multi-line telephone sets (Procedure 40)
Enable the appropriate feature in the data block.

Note: Responses in parentheses are default values throughout the procedures.

Procedure 35

Respond to the following prompts in LD 15

Prompt	Response	Description
REQ	CHG	Change data.
TYPE	CDB RDR_DATA	Customer data block Call Redirection data (Release 21 gate opener)
CUST	0–99	Customer number
- OPT	aaa	Options
- FNAD	FDN	Call Forward No Answer DID calls—Flexible CFNA DN
- FNAT	FDN	Treatment for external CFNA calls (non-DID)—when FDN is selected, CFCT handles the call
- FNAL	FDN	Requests treatment for CFNA—when FDN is selected, DID calls are forwarded
- RCNT	0–(5)	Maximum number of internode hops allowed in a network redirection call. This field must be set to greater than 0 for a network redirection to take place. Note: The RCNT prompt is only checked for redirected calls when the ISDN prompt is yes in LD 15.

Procedure 36**Respond to the following prompts in LD 16**

Prompt	Response	Description
REQ	CHG	
TYPE	RDB	Route data block
CUST	0–99	Customer number
ROUT	0–511	Route number
.		
.		
.		
srvc		
NCNA	YES, (NO)	Network Call Name is (is not) allowed
NCRD	YES, (NO)	Allows Network Call Redirection messages to be sent (or blocks messages if NCRD= NO)
		Note: Network Call Redirection can occur without answering YES to the NCRD prompt. This prompt only controls the sending of Network Call Redirection messages, not the actual redirection of the call. The message supplied when NCRD = YES provides the information for the CLID display. When NCRD is NO, the call is redirected without the CLID redirection information. It is appropriate to set NCRD = NO when your network interfaces with a network that is equipped with a version of ISDN earlier than X11 release 14.
TRO	YES, (NO)	Trunk Optimization
		TRO economizes trunk use throughout the network as part of the NCRD feature.

Procedure 37
Respond to the following prompts in LD 95

Prompt	Response	Description
REQ	CHG	Change existing data
TYPE	CPND	Call Party Name Display data block
CUST	0–99	Customer number
...		
RESN	YES	Allow display of reason for redirecting calls
CFWD	xxxx, (F)	Display mnemonic for (Network) Call Forward All Calls. Default is "F." Enter the mnemonic that represents NCFAC on a set's CLID display.
CFNA	xxxx, (N)	Mnemonic for (Network) Call Forward No Answer display. Enter the mnemonic that represents NCFNA on a set's CLID display. Default is "N."
HUNT	xxxx, (B)	Mnemonic for Network Hunting display
PKUP	xxxx, (P)	Mnemonic to allow Call Pickup display
XFER	xxxx, (T)	Mnemonic for Call Transfer display

Procedure 38**Respond to the following prompts in LD 95**

Prompt	Response	Description
REQ	CHG	
TYPE	NAME	Call Party Name Display name entry
CUST	0–99	Customer number
DIG	xxx xx	An existing Dial Intercom Group number (0–253) and member number (0–99)
NAME	aaa...a	CPND name using ASCII characters. The DIG prompt is reprompted. Enter <CR> to get the DN prompt.
DN	xxxx	DN of eligible type.

Procedure 39
Respond to the following prompts in LD 10

Prompt	Response	Description
REQ	CHG	
TYPE	500	Enter set type
HUNT	xxxx	Hunt DN for internal calls
FTR	EFD xxx	External Flexible Call Forward DN Only allowed if LD 15 is properly configured: FNAD = FDN FNAL = FDN FNAT = FDN If the DNXP package is equipped, up to 7 digits are allowed; otherwise, only 4 digits can be entered. Accepted only if CLS is MWA or FNA.
	EHT xxxx	External Hunt DN Only allowed if CLS = CFTA Same digits as defined above
	FDN xxxxxxxx	Flexible Call Forward No Answer DN (cannot be an LDN) Same digits as defined above

Procedure 40**Respond to the following prompts in LD 11**

Prompt	Response	Description
REQ	CHG	
TYPE	xxxx	Enter set type as appropriate
FDN	x..x	Flexible CFNA DN where xx is the MCDN. The FDN value should include AC1/AC2 when applicable (up to 13 digits).
EFD	xxxx	Network CFNA DN for external calls
HUNT	xxxx	Network Hunt DN for calls with CLS = CFTD
EHT	xxxx	Network Hunt DN for external calls

Feature testing

To verify Network Call Redirection (NCRD), do the following:

- 1 Place a call from the Meridian 1 system over a PRI trunk to a Digit Display telephone at a far end facility. This far end facility must be on a different node.
- 2 To make sure that network redirection takes place, the originally dialed number must be in an NCFNA or NCFAC condition.
- 3 Verify that the call is terminated correctly.

Note: In order to do steps 4 and 5, both ends must be equipped with X11 release 15 or later ISDN software.

- 4 Verify that the display of the originating party contains the following:
 - Originally called party DN (or redirecting DN)
 - Connected party DN
 - Reason for redirection
 - Connected party name
- 5 Verify that the display of the terminating party contains the following information:
 - Calling party DN
 - Originally called party DN (or redirecting DN)
 - Reason for redirection
 - Calling party name
- 6 Verify that the call can be released properly from either end.
- 7 Have the far end place a call that is redirected. Then repeat steps 4 through 6.